ZEV Regulation Workshop

Date: May 3, 2010

Time: 10:00 am

Location: Byron Sher Auditorium, Sacramento

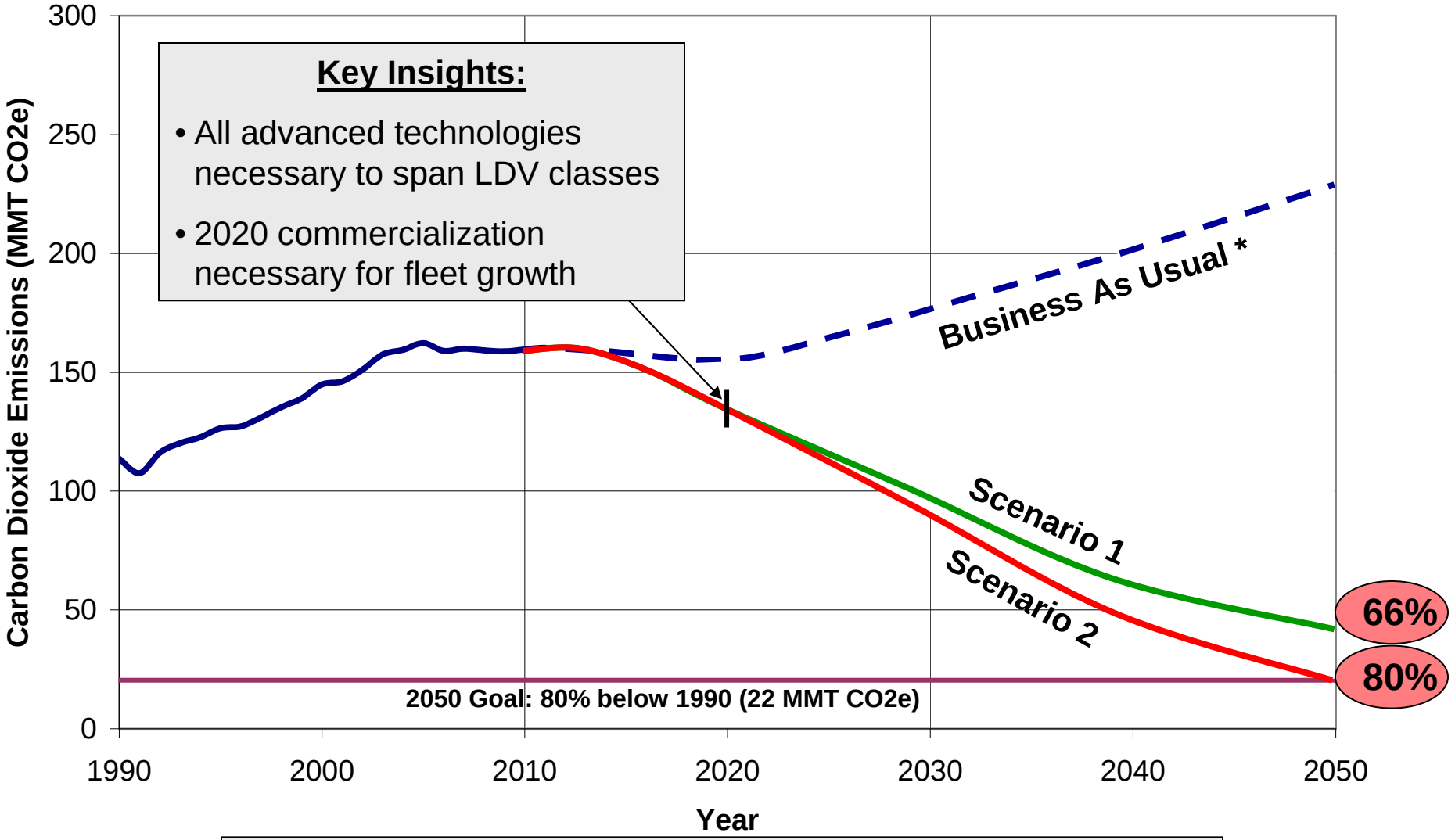
Agenda

- 2009 Review
- Goals and Purpose of Regulation and Amendments
- Policy Development
- Policy Framework
- Regulatory Process

2009 Review Process

- White Paper
  - GHG Analysis
  - Review of ZEV Technologies
  - Review of Complimentary Policies
- Update to the Board – December 2009

LDV GHG Scenarios

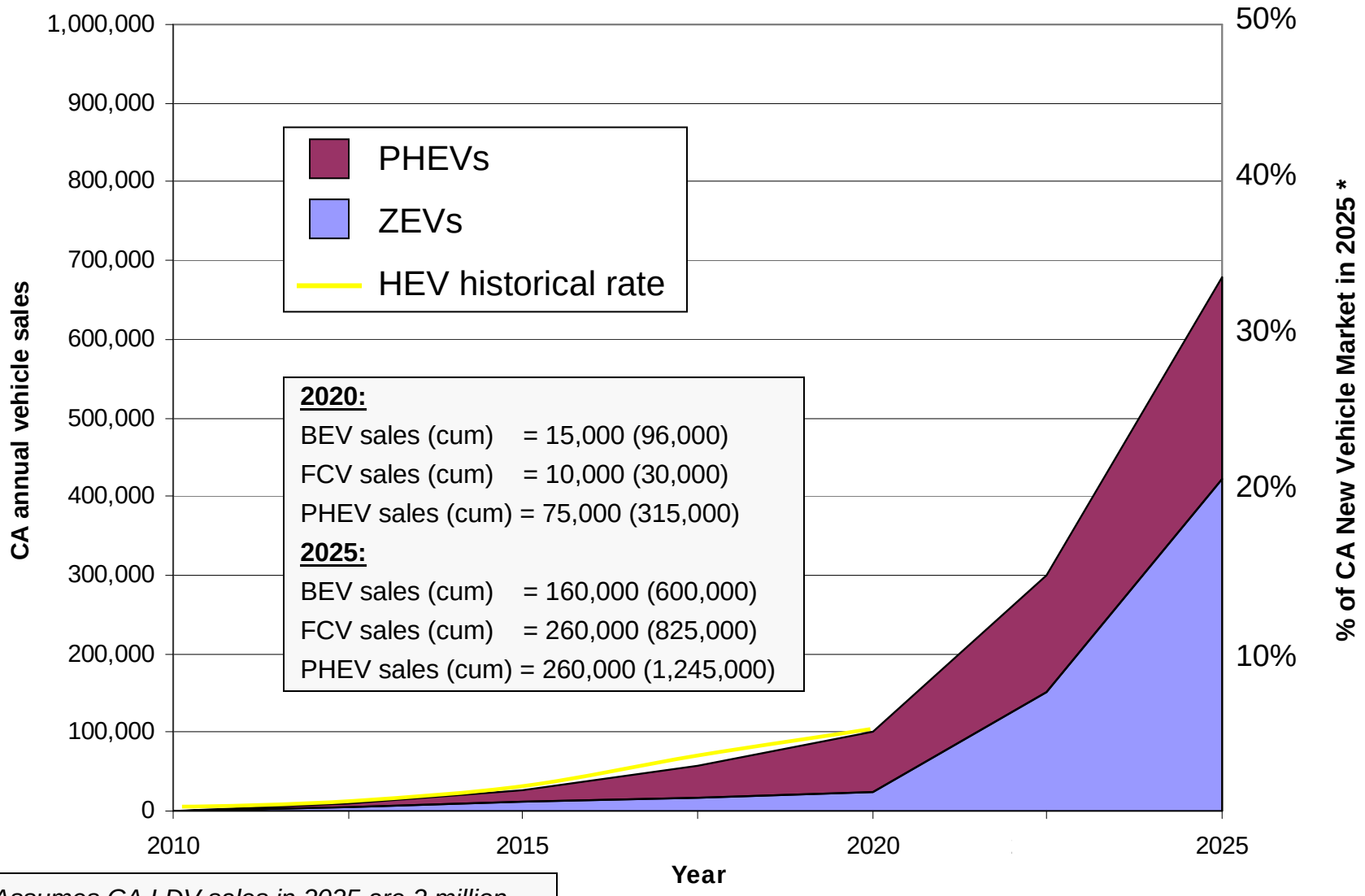


Scenario 1: 100% ZEV sales by 2050, 1 billion gallons gasoline equiv (BGGE) biofuels

Scenario 2: 100% ZEV sales by 2040, and more biofuels (1.7 BGGE)

* Hypothetical BAU for this analysis only, does not represent ARB projections. Assumes Pavley 1 and LCFS are implemented.

Launching ZEV Market for 80% Scenario



** Assumes CA LDV sales in 2025 are 2 million*

ZEV Technology Review: Fuel Cells

- Many technological barriers have been overcome, with two challenges still remaining: **cost** and **durability**
- Cost: $61/kW at high volume (2009 DOE projection)
- Daimler, Ford, GM, Honda, Hyundai/Kia, Toyota and alliance Renault SA and Nissan issue a joint LUA

> "…automakers strongly anticipate that from 2015 onwards a significant number of FCV could be commercialized"

ZEV Technology Review: Batteries

- Li-Ion **durability** and **cost** challenges remain, but have the potential to become commercially viable and profitable within next 10 years
- Cost: $1000/kWh (today), potential for $300/kWh at high volume
- Durability: Challenges remain for extreme climates

White Paper Conclusions

- PZEV and AT PZEVs commercially viable, and will move into LEV III Criteria Pollutant and GHG requirements
- Market forces are still not sufficient to spur ZEV commercialization in California
- A ZEV mandate is the most appropriate mechanism for ensuring transformation of LDV sector
- Staff should pursue a policy option that gives appropriate flexibility, but is in line with 2050 goals

Resolution 09-66

ZEV Regulation will:

- Focus on criteria pollutants and GHG reductions
- Ensure transformation of LDV sector to meet 2050 GHG goals
- Ensure successful launch of commercial ZEVs and Enhanced AT PZEVs
- Focus on ZEVs and Enhanced AT PZEVs
- Base policy decisions on LEV III GHG requirements

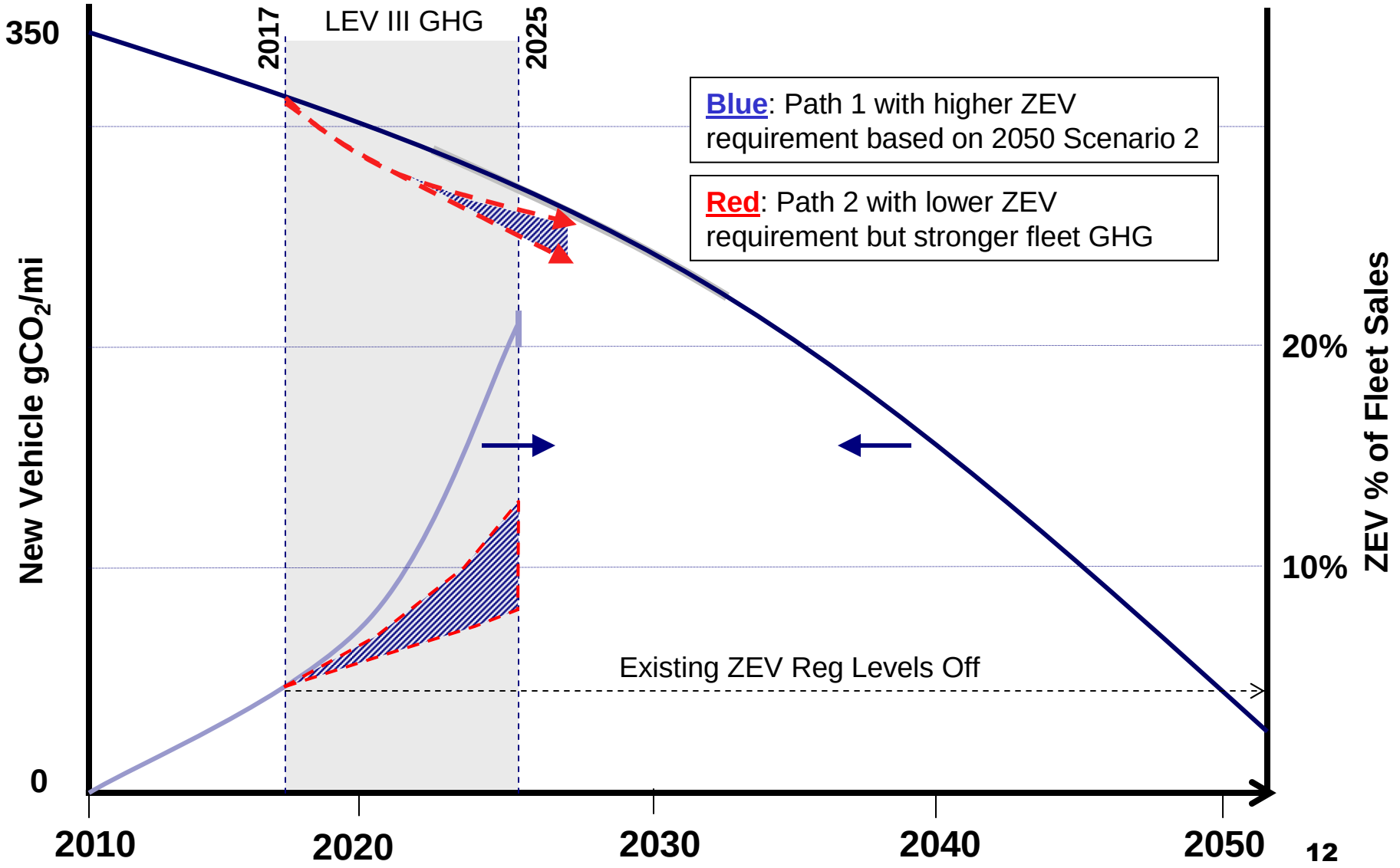
Goals of the ZEV Regulation

1. Launch ZEV markets to commercial scale by 2025
    - LEV IV will assume substantial portion of fleet being ZEV
2. Encourage diversified spectrum of ZEV applications in LDV sector

Purpose for Regulatory Changes

- Shed off PZEVs and AT PZEVs
- Revise regulation to reflect updated program goals
- Adjust or eliminate historical provisions to better meet stated goals

Policy Development



Policy Alternative 2: Pros and Cons

Pros:

Cost Implications

- Likely higher overall in Policy 1

Industry Growth

- More flexible supplier production & fuel capacity growth

GHG Reductions

- Achieves larger fleet GHG reductions (in interim years, 2020-2030ish)

Cons:

Cost Implications

- Less volumes means technologies not coming down cost curve as quickly

Industry Growth

- Less certainty in ZEV sales, challenge for supplier & fuel provider planning

GHG Reductions

- Reductions come from fewer ZEVs in fleet

Legal Issues

- Complexity in translating policy to a national program

Policy Framework

- ZEV and Enhanced AT PZEV stay in ZEV
- Phase 4 (2015 - 17) numbers stay as written
- Phase 5 (2018 - 21) and Phase 6 (2022-25)
  - ZEVs between 5% and 20% of new sales by 2025
  - ZEV credits, caps, multipliers to be reviewed and modified to better support new goals

Framework: Enhanced AT PZEVs and ZEVs

	Transition Date to LEV III
PZEVS	2014
AT PZEVs	2017

Discussion Questions

- Any questions on PZEV and AT PZEV transition into LEV III?

Framework: Phase 4 Unchanged

	2015 – 2017 (cum.)	% of Annual Sales
Type V	~20,500	0.4%
Type II	~48,000	1%
Enhanced AT PZEV	~80,000	1.6%

*Based on 1.6 million vehicle sales in CA annually

- Staff is NOT proposing new requirements for Phase IV
- Staff is reviewing and considering minor revisions to provisions between 2015-2017

Framework: Phase 5 and 6

Phase 5	2018-2021	2-5% annual requirement
Phase 6	2022-2025	5-20% annual requirement

Discussion Questions

- What are any potential drawbacks to this approach?
- What should the percentage of new sales be in 2025 to ensure ZEV based LEV IV?
- What should the interim requirements be from 2018 to 2025? (shape of the “hockey stick”)
- Should there be an Enhanced AT PZEV requirement in the ZEV regulation??

Framework: Regulatory Mechanisms

Potential Regulatory Mechanisms

- Historical Credits
- Multipliers
- Phased Volume requirements

Discussion Questions

- Are there additional ways to provide flexibility?
- Which of the options listed are attractive?
- Which of the options listed are not attractive?

Framework: ZEV Credit Factors

Concepts for Discussion

1. **Range**
2. **Refueling rate**
3. **Refueling access** (station or charger availability)
4. **Full function capability** (vehicle size potential, operating climate, payload, etc)
5. **Long-term veh cost potential** (reward technologies that have potential low-price premium at high volume)
6. **WTW performance** (would need to assume future grid and H2 production)
7. **Innovation** (reward for higher investment risk)
8. **Technology portfolio** (is the OEM pursuing multiple techs?)
9. **Others?**

Regulatory Process Overview

- Complimentary Policies
- Economic Analysis
- Environmental Analysis
- Workshop
- Board Documents
- Board Hearing

Complementary and Concurrent Policies

- LEV III (GHG and Criteria Pollutants)
  - November Board Hearing 2010
- Clean Fuels Outlet
  - December Board Hearing 2010
- CPUC Rulemaking
- ARB EV Infrastructure Review
  - Summer 2010
- Clean Vehicle Rebate Project (ARB AB 118 funds)

Complementary and Concurrent Policies Contact Information

Clean Fuels Outlet

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EV Infrastructure Review

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Economic and Market Assessments

- *Joint effort for both ZEV and LEVIII Regulations*
- Consumer Net Cost Evaluation
  - Upfront vehicle costs
    - Advanced vehicle production cost functions + RPE
    - Government purchase incentives (Fed & CA)
    - Sales scenarios, including sales outside CA (affects cost functions)
  - Total cost of operation (TCO) over life of the vehicle
    - Fuel price projections (gasoline, electricity, hydrogen)
    - Home equipment (home chargers or fueling appliances)
    - Discount rate for future fuel expenditures
- Economic Impact to State
  - Jobs created or lost
  - Impact to CA businesses
  - Impact to CA government agencies and operation
- Cost Effectiveness (Production $ / ton CO2 reduced)

Environmental Impact Assessment

- *Joint effort for both ZEV and LEVIII Regulations*
- Identify baseline emission scenario (EMFAC, other sources)
- Climate change emission (CO2-eq) reductions from baseline
- Criteria pollutant emission reductions from baseline
- Includes net emissions from vehicles and fuel production

ZEV Regulatory Timeline

- July ZEV Workshop
- Documents Available: October 4, 2010
- Board Hearing: November 18 or 19, 2010

Contact Information

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For more information and updates, please visit our website:
http://www.arb.ca.gov/msprog/zevprog/zevprog.htm